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PATENT APPLICATION

PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Makoto MIYAMOTO et al.

On Appeal from Group: 1756

Application No.: 10/656,337

Examiner: M. ANGEBRANNDT

Filed: September 8, 2003

Docket No.: 117051

For: INFORMATION-RECORDING MEDIUM

APPEAL BRIEF TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is our Brief on Appeal in the above-identified application.

Also attached hereto is our Check No. 185790 in the amount of Five Hundred Dollars ($500.00) in payment of the Brief fee under 37 C.F.R. 41.20((b)(2). In the event of any underpayment or overpayment, please debit or credit our Deposit Account No. 15-0461 as needed in order to effect proper filing of this Brief.

For the convenience of the Finance Division, two additional copies of this transmittal letter are attached.

Respectfully submitted,

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Date: October 31, 2006

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PATENT APPLICATION

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BRIEF ON APPEAL

Appeal from Group 1756

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TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application is Hitachi Maxell, Ltd., by way of an Assignment recorded in the U.S. Patent and Trademark Office beginning at Reel 014237, Frame 0500.

II. RELATED APPEALS AND INTERFERENCES

NONE.

III. STATUS OF CLAIMS

Claim 1 is on appeal.

Claim 1 is pending.

No claims are allowed.

Claim 1 is rejected.

No claims are withdrawn from consideration.

Claims 2-9 have been canceled.

IV. STATUS OF AMENDMENTS

An Amendment After Final Rejection was filed on August 2, 2006. By an Advisory Action dated August 14, 2006, it was indicated that the requested amendments had been entered. A Supplemental Amendment is filed herewith solely for the purpose of canceling claims 2-8.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter is directed to an information-recording medium comprising a substrate, a recording layer, and at least one other layer formed over the recording layer (Fig. 1; paragraph [0085]). The recording layer has a film thickness of not more than 15 nm and is rewritable in accordance with phase-change caused by irradiation by a laser beam, the recording layer consisting of Bi, Ge, and Te in specific composition ratios (paragraph [0126]). The composition ratios of the recording layer are within ranges bounded by specific points on a triangular composition diagram having apexes corresponding to Bi, Ge, and Te.

In claim 1, the recording layer has a composition bounded by the following points on a triangular composition diagram having apexes corresponding to Bi, Ge, and Te:

F3 ($Bi_{3.5}$, Ge_{46}, $Te_{50.5}$);

C3 (Bi_{4}, Ge_{46}, Te_{50});

D3 (Bi_{5}, Ge_{46}, Te_{49});

D5 (Bi_{10}, Ge_{42}, Te_{48});

C5 (Bi_{10}, Ge_{41}, Te_{49});

F5 ($Bi_{7.5}$, Ge_{41}, $Te_{51.5}$) (paragraph [0116]).

In the information-recording medium according to the present invention, there is the specific effect that all of problems 1-8 as described in paragraph [0160] in the specification can be solved by setting the composition of the Bi-Ge-Te type recording layer to the composition as recited in claims 1, 2, 3, 7 and 8. The problems resolved by the claimed invention include (1) deterioration of the signal at the innermost circumferential portion during the CAV recording; (2) deterioration of the multiple times rewriting performance at the innermost circumferential portion during the CAV recording; (3) deterioration of the storage life at the innermost circumferential portion and the outermost circumferential portion

during the CAV recording; (4) deterioration of the cross-erase performance at the innermost circumferential portion during the CAV recording; (5) deterioration of the cross speed overwrite performance; (6) deterioration of the cross speed crosstalk performance; (7) deterioration of the cross speed cross-erase performance; and (8) increase of the number of layers in order to secure the cross speed performance (addition of the nucleus-generating layer) (paragraph [0160]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

1) Claim 1 is rejected under 35 U.S.C. §103(a) over U.S. Patent No. 6,761,950 to Kojima et al. (Kojima) in view of Japanese Patent Publication No. 63-225935 to Yamada et al. (Yamada)[1].

[1] The March 2, 2006 Office Action rejected claims 1-9 over Kojima in view of either Yamada or another reference and further in view of Kondo. However, the body of the rejection is solely directed to alleging the additional feature of a wobbled groove. Thus, Appellants understand the rejection was directed solely against claim 8 and not claim 1.

VII. ARGUMENT

The claimed subject matter is directed to an information-recording medium comprising a substrate, a recording layer, and at least one other layer formed over the recording layer. The recording layer has a film thickness of not more than 15 nm and is rewritable in accordance with phase-change caused by irradiation by a laser beam, the recording layer consisting of Bi, Ge, and Te in specific composition ratios. The composition ratios of the recording layer are within ranges bounded by specific points on a triangular composition diagram having apexes corresponding to Bi, Ge, and Te.

On the other hand, Yamada (JP 63-225935) does not teach or suggest the above specific effect of the present invention. Therefore, we believe that the specific effect of the present invention can not be anticipated from any of Kojima, Yamada and Kimura.

In claim 1, the composition of the recording layer is bounded by the following points: F3 ($Bi_{3.5}$, Ge_{46}, $Te_{50.5}$); C3 (Bi_4, Ge_{46}, Te_{50}); D3 (Bi_5, Ge_{46}, Te_{49}); D5 (Bi_{10}, Ge_{42}, Te_{48}); C5 (Bi_{10}, Ge_{41}, Te_{49}); and F5 ($Bi_{7.5}$, Ge_{41}, $Te_{51.5}$).

In contrast, Kojima discloses a recording layer having a composition of $Ge_{45}Bi_4Te_{51}$ (col. 58, table 11, Sample 11-2), a thickness of 11 nm (col. 58, line 4), and formed within information recording medium 28 (col. 57, lines 47-51). As acknowledged by the Patent Office in the June 2, 2006 Office Action, the composition of this recording medium lies outside the range of any of the claims (page 4, lines 10-12).

Yamada discloses an optical information recording medium having a structure which includes a substrate, a 100 nm ZnS layer, a 100 nm recording layer, and a 200 nm ZnS layer (page 4, lines 15-16). The recording layer is disclosed as being bounded by the polygons set forth in the second table (see Fig. 1 below, showing a plot of Yamada's compositions on a BiGeTi ternary diagram). The recording layer thickness associated with these compositions is 100 nm (page 4 of English translation, line 9).

Further, Yamada teaches that the best composition of the Bi-Ge-Te type recording layer is the composition B-series on the line connecting between GeTe ($Ge_{50}Te_{50}$) and Bi_2Te_3. The composition B-series, however, is not included within the ranges of the compositions of the present invention.

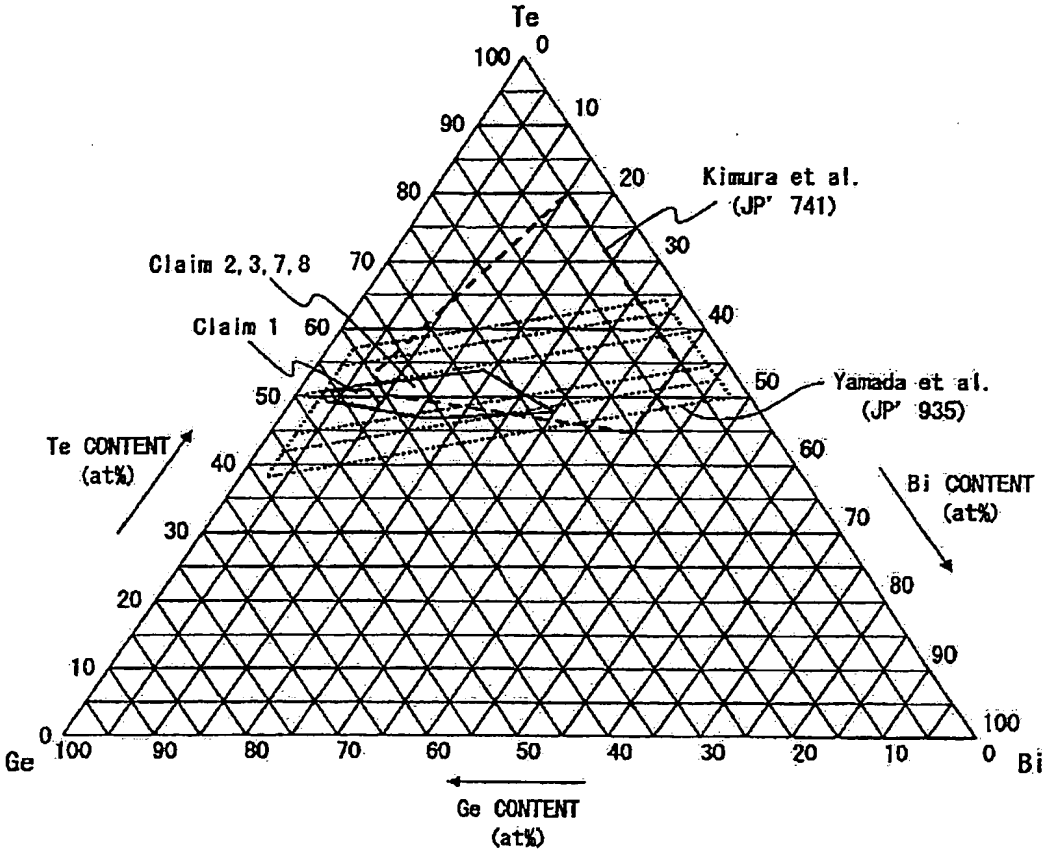

Figure 1.

Kojima is relied upon as the primary reference for all rejections. As discussed above, the May 2, 2006 Office Action acknowledges that Kojima does not disclose any recording layer composition corresponding to the claimed recording layers, but asserts that the combination of the disclosure of Kojima with that of either Kimura or Yamada would have rendered the claimed recording layers obvious.

However, the Office Actions have impermissibly combined references. To establish a *prima facie* obviousness rejection, motivation or suggestion to combine must be established.

Yamada discloses a recording medium having a thickness of 100 nm, the recording medium of Yamada additionally surrounded by two ZnS layers. Because Yamada fails to disclose or suggest that the composition of Yamada is suitable for use in applications as thin as 15 nm and without surrounding ZnS layers, the asserted combination is impermissible.

A. Applicable Law

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." MPEP § 2143 (citing In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991)) (emphasis added).

Further, "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." MPEP § 2143(III) (citing In re Mills, 916 F.2d 680 (Fed. Cir. 1990)). "With regard to rejections under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not." (MPEP § 2142).

While a modification may be a technologically simple matter, without a specific understanding within the knowledge of the art, it cannot be inferred that one of ordinary skill would have had the motivation to perform the modification (MPEP § 2143(I) (citing In re Katzab, 217 F.3d 1365, 1371(Fed. Cir. 2000)). "[I]mpermissible hindsight must be avoided

and the legal conclusion must be reached on the basis of the facts gleaned from the prior art (MPEP § 2142).

B. Claim 1 is Patentable over Kojima in view of Yamada

The Patent Office admits in the June 2, 2006 Office Action that Kojima teaches a Ge-Bi-Te recording film having a composition outside the range of the claims (page 4, lines 10-12). Additionally, Yamada discloses a recording layer having a thickness of 100 nm (page 4, line 9). Neither Kojima nor Yamada discloses or suggests use of compositions suitable for 100 nm recording layers in the recording layer of Kojima. Absent such disclosure or suggestion, there is no motivation to combine the applied references to result in Appellants' claims. Combining the references to do so requires impermissible hindsight.

Further, Kojima teaches that diffusion of S occurs from a dielectric layer formed from $(ZnS)_{20}$ $(SiO_2)_{80}$ [mol %] to the recording layer when the dielectric layer and the recording layer do not have an intermediate layer (see column 3, lines 26-36). In addition, Kojima teaches that "[i]f a lot of S diffuses into recording layer, a reduction of the reflectance of recording layer is caused, and overwrite cyclability deteriorates" (col. 2, lines 52-55).

In order to solve the problem of reduced cyclability due to S diffusion, Kojima discloses an information recording medium in which the dielectric layer, which contacts with the recording layer, is formed of a Zr-Zn-S-O based material in place of $(ZnS)_{20}$ $(SiO_2)_{80}$ (for example, see claim 1).

In addition, Kojima teaches, as shown in Table 2 (col. 39, lines 33-51), that when using $(ZnS)_{20}$ $(SiO_2)_{80}$ as the material of the dielectric layers (sample No. 1-1), the number of overwrite cycles is 1,000 times and when using a Zr-Zn-S-O based material as the material of the dielectric layers (sample Nos. 2-5 to 2-9), the number of overwrite cycles is not less than 10,000 times. It follows from Table 2 and the disclosed reduction of cyclability due to diffusion of S, that when using $(ZnS)_{20}$ $(SiO_2)_{80}$ as a material of the dielectric layer, the

number of overwrite cycles is reduced due to the diffusion of S between the recording layer and the dielectric layer.

Further, Table 2 of Kojima indicates that, when using ZnS as a material of the dielectric layers (sample No. 1-3), the number of overwrite cycles is 1,000 times, similar to the sample No. 1-1 having the dielectric layers formed of $(ZnS)_{20}$ $(SiO_2)_{80}$. This also is caused by the S diffusion problem, that is, when the dielectric layer, which contacts with the recording layer, is formed of ZnS, diffusion of S between the recording layer and the dielectric layer will occur, and thus the number of overwrite cycles is reduced.

Yamada, however, discloses the use of ZnS on both sides of the recording layer: "in each composition points corresponding to Examples 1 and 2, optical disks were manufactured and dynamic response thereof were measured. In the optical disk, ZnS, Ge-Bi-Te film and ZnS were formed in this order on the PMMA resin substrate ..." (page 6, lower left column, lines 10-17).

Considering the teachings of Table 2 and the S-diffusion problem of Kojima, one of ordinary skill in the art would have expected that the diffusion of S between the recording layer and the ZnS layer would occur in the optical disk disclosed in Yamada because the ZnS layer and the recording layer are in contact in the structure of Yamada. Thus, Kojima teaches away from the combination of Kojima and Yamada as proposed in the Office Action.

Further, ranges of the composition as taught in Yamada are very wide in comparison with that of the present invention as shown the drawing in Fig. 1. In particular, ranges (areas) of the composition as taught in Yamada are more than ten times the range (area) of the composition as recited in claim 1 (see Fig. 1).

Considering the above comparison of the composition between the present invention and Yamada, it would not have been obvious to one of ordinary skill in the art to select the composition of the present invention from ranges of the composition as taught in Yamada.

For the foregoing reasons, one of ordinary skill in the art would not have been motivated to use the recording layer disclosed in Yamada to modify the recording layer disclosed in Kojima for the purpose of avoiding the problem of S-diffusion. Thus, the rejection is improper. Appellants respectfully request withdrawal of the rejection.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are in error and that the claims are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of the claims.

Respectfully submitted,

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APPENDIX A - CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

1. An information-recording medium comprising a substrate and a recording layer which is rewritable in accordance with phase-change caused by being irradiated with a laser beam, the information recordin medium further comprising at least one other layer formed over the recording layer, wherein the recording layer consists of Bi, Ge, and Te, and composition ratios thereof are within a range surrounded by the following respective points on a triangular composition diagram having apexes corresponding to Bi, Ge, and Te, and the recording layer has a film thickness of not more than 15 nm:

F3 ($Bi_{3.5}$, Ge_{46}, $Te_{50.5}$);

C3 (Bi_{4}, Ge_{46}, Te_{50});

D3 (Bi_{5}, Ge_{46}, Te_{49});

D5 (Bi_{10}, Ge_{42}, Te_{48});

C5 (Bi_{10}, Ge_{41}, Te_{49});

F5 ($Bi_{7.5}$, Ge_{41}, $Te_{51.5}$).

APPENDIX B - EVIDENCE APPENDIX

NONE

APPENDIX C - RELATED PROCEEDINGS APPENDIX

NONE